Exhibit E

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SUPREME COURT
ALL COUNTIES WITHIN THE STATE OF NEW YORK

IN RE: NEW YORK CITY ASBESTOS LITIGATION

DEPOSITION UNDER ORAL
EXAMINATION OF
CHRISTIAN HOLINKA
(VOLUME II)

This Document Applies To:
CHRISTIAN HOLINKA
INDEX NO.: 114120-06

PRIORITY ONE COURT REPORTING SERVICES, INC.
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Staten Island, New York 10314
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Transcript of the deposition of the Plaintiff, called for Oral Examination in the above-captioned matter, said deposition being taken pursuant to Federal Rules of Civil Procedure by and before CHERYL F. BAREN, a Notary Public and Shorthand Reporter, at the Offices of Weitz & Luxenberg, 120 Wall Street, New York, New York, on Thursday, February 22, 2007, commencing at approximately 10:30 in the forenoon.

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material.
Q Who was your supervisor when you were working at Booth?
A Dr. Blaustein.
Q Do you remember Dr. Blaustein's first name?
A Ansel.
Q Is Dr. Blaustein still alive, if you know?
A No. No, he's not still alive.
Q I try not to ask questions in an ambiguous fashion but please, clarify as you are doing.
Besides yourself were there other laboratory technicians working alongside you with similar duties?
A The section head of the laboratory.
Q And who was that?
A Her name is Olga, first name, last name Bzrorad. I'm going to try to spell it.
Q Okay, thank you.
A B-Z-R-O-R-A-D. I'm not sure of the spelling.
Q And is Olga still alive?
A Yes -- I don't know but -- I don't know.
Q When was the last time you had any contact with her?

A In 1960.
Q So, over 40 years ago?
A Uh-huh.
Q That is a yes, right?
A Yes.
Q So, was the chain of command you would report to Olga and then Dr. Blaustein supervised everybody?
A Yes, that's correct.
Q Did anybody else work with you at Booth during that three and a half months?
A Yes.
Q Who else did?
A I don't remember their names.
Q Did they have duties similar to yours as a lab technician?
A Yes.
Q What were your shift or hours typically?
A Nine to five, day shift.
Q Monday to Friday?
A Yes.
Q How did you get that job?
A I applied for it at the hospital. Being trained in the Army as a medical laboratory

technologist I was qualified.
Q During the time that you were at Booth, do you believe that you were exposed to asbestos in any way?
A Yes.
Q Do you believe that you personally handled any materials that contained asbestos while at Booth?
A Yes.
Q Can you tell me all the different types of materials that you handled that you believe contained asbestos when you worked there?
A Bunsen burner pads that had a center round asbestos component to diffuse the heat, distribute the heat uniformly. And heat mittens that were used to handle hot glass work from drying ovens or otherwise hot.
Q How do you believe that you were exposed to asbestos from the Bunsen burner pads at Booth?
A The asbestos gradually becomes brittle due to the high heat and the heat moves the air really and one would expect that dust particles would be generated. Also once the Bunsen burner pad was no longer usable because the center piece became brittle, you dispose of it.

Q And replace it?
A And replace it, yes.
Q Can you give us any sort of a quantification as to how long a Bunsen burner pad would last?
A It depends on the frequency of its use. And usually a Bunsen burner is the principal heat source of all the laboratories I've worked in. Usually it's used pretty frequently, meaning certainly daily, very frequently. I would guess, and that's not a precise answer, that certainly every few days you would replace it. But again, it depends upon the frequency of use.
Q Understood. Would it also depend on the temperature of the flame that was being used in any application?
A I would say the flame temperature is pretty constant. It's gas that comes right out of a burner.
Q Do you know what the temperature of the gas typically was out of those Bunsen burners?
A No. Interesting question.
Q Do you know what the fuel source of the gas was?
A I would imagine the same fuel source that

A Well, as part of your laboratory courses in academia, you do experiments requiring Bunsen burners.
Q Let's talk about then the part-time work you did first. What was the name of the research laboratory that you did the part-time work at?
A Department of physiology.
Q So, this was a lab that was affiliated with the school?
A Yes.
Q When did you first start working there part-time as an undergraduate?
A In spring 1960.
Q Did you work there continuously part-time?
A Yes.
Q For how long did you work there continuously part-time?
A Until mid-1962.
Q And it was at that point that you had completed your undergraduate work?
A Yes.
Q Where was the department of physiology lab located?
A At the Life Sciences Building on the main campus, University of Cal Berkeley.

Q Do you know if that building is still there?
A Yes.
Q It is?
A Yes, it is.
Q And when was the last time that you had an opportunity to be in that building?
A About a year and a half ago, two years ago.
Q Did you have the opportunity to go to the space where you worked out of in your last visit?
A I had the opportunity but I did not go into the laboratories. The building has been completely changed and renovated.
Q So, you understand that the physical layout of the area where you were working part-time has changed from the time that you were there?
A Yes.
Q When you were there can you give me an idea of the size of the laboratory that you were in?
A In square feet?
Q Or by length and width, height, anything you can do.
A It was two different rooms about 4 to 600 square feet.

Q And did you work in both rooms?
A Yes.
Q Were the Bunsen burners in one room or both rooms?
A In both.
Q How many Bunsen burners were in the rooms?
A About two each.
Q Did these Bunsen burners in their physical appearance seem similar to those that you encountered when you were at Booth?
A Yes.
Q How do you believe that you were exposed to asbestos from the Bunsen burners as a part-time worker at UC Berkeley?
A As the flame when it was used frequently, the insert became brittle, it generated dust and it had to be exposed -- disposed of and replaced by another pad.
Q Was there anything different about the nature you believe you were exposed from those Bunsen burners at UC Berkeley as opposed to those you encountered at Booth?
A No.
Q Did you ever have any responsibility for

replacing these spent pads while you were working part-time at Berkeley?
A Yes.
Q And where would you get the replacement pads from?
A The departmental supply cabinet.
Q And thinking back to the lab at Berkeley, where was that located?
A At the Life Sciences Building in the physiology department.
Q Was it located within the physical space of the two rooms that comprised the lab?
A It was in a separate room, the supply room.
Q Down a hallway or something like that?
A Down a hallway, yes.
Q How many times do you recall picking up replacement pads?
A I do not recall exactly.
Q Was there --
A An estimate is once every two or three weeks.
Q And the replacement process would entail removing the old pad, then what would happen with it?
A You dispose the old pad in general garbage,

there?
A Dr. Cook.
Q Do you know Dr. Cook's first name?
A Sherburne.
Q And is Dr. Cook still alive?
A No.
Q The classes that you took in chemistry and physiology, how do you believe you were exposed to asbestos through taking those classes?
A The asbestos pad, as I said, when exposed to high heat disintegrated eventually. There were cracks in it and it generated fine dust. I did not dispose, that was somebody else's job.
Q So, it would have been through your use of the Bunsen burners and these pads --
A Yes.
Q -- at times while taking these classes?
A Yes.
Q Was there a standard amount of Bunsen burners present in the labs that you would take these classes in?
A One per workbench.
Q Would you typically work at the same workbench each class or would it just be random?

A In a given course the same workbench.
Q Did you wind up taking different courses, say in chemistry, that wound up being in the same room but different work spaces?
A I don't think the same room and, therefore, also different work spaces.
Q And then going to the physiology classes, did you take different courses in physiology where you used these Bunsen burners?
A Yes.
Q Were they all in the same classroom or different classrooms?
A Different laboratories.
Q And different work spaces?
A Yes.
Q Do you know the brand, trade or manufacturer's name of any of the pads that were used on the Bunsen burners that you encountered in any of these classes?
A Of the pads, you're saying?
Q Yes, of the pads.
A I do not specifically know the brand names.
Q Do you know who was the supplier of those pads that you encountered specifically in those rooms?

A There were standard suppliers also to the physiology department.
Q As a student you did not have responsibilities for ordering supplies, right?
A No, I did not.
Q Besides encountering the Bunsen burner pads, are there any other ways that you think you were exposed to asbestos during the course work that you took at UC Berkeley?
A We did use heat mittens but otherwise to my knowledge, no.
Q How often would you need to use a heat mitten during the course of a class?
A At a given session several times.
Q Did you need to use them during every session?
A No.
Q And a session or a period was how long, sir, about?
A Typically about twice a week for 12 weeks.
Q And each session twice a week would be about how long?
A About three hours.
Q And do you know the brand, trade or

manufacturer's name of any of the mittens that you used in any of these courses?
A No.
Q Were they similar in appearance to the mittens that you encountered while working part-time in the lab?
A Yes, they were.
Q Anything distinguishing in your mind about them as opposed to what you saw in the lab?
A To my knowledge, no.
Q That is all I am asking is to your knowledge.
A Okay.
Q Outside of the Bunsen burner pads and the mittens, do you believe that you were exposed to asbestos in any other way while taking the classes as an undergraduate?
A I do not know.
Q Can you, as you sit here today, give me any other specific way that you think you may have been exposed to asbestos from the classes besides what you told me?
A No, I cannot.
Q Besides the course work in the labs, are

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at Columbia?
A 1971.
Q Would it have been contemporaneous with the course work at SUNY?
A Yes, it was.
Q Did you get the job through connections at SUNY?
A No, I did not.
Q How did you come to get that job?
A I applied personally through somebody, a professor there who I knew.
Q How long did you work in the clinical chemistry department at Columbia University?
A Until 1974.
Q And was it basically employment there continuous with the time that you were taking the studies at SUNY Stony Brook?
A Yes.
Q During the time that you were out at Stony Brook, do you believe that you were exposed to asbestos while taking your studies?
A Yes, I was.
Q During the time that you were working for Columbia, do you believe that you were exposed to

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asbestos?
A Yes, I was exposed.
Q We are going to break them both down then. When you were taking the courses at SUNY Stony Brook, did you also take course work during the summers?
A Yes.
Q And how do you believe that you were exposed to asbestos when you were taking the graduate school studies at Stony Brook?
A In my research for my degree.
Q And how do you believe in conducting this research you were exposed to asbestos?
A Through Bunsen burner pads and heat insulating mittens.
Q With what frequency would you be --
MR. SCHAFFER: Withdrawn.
Q Did you handle both of these types of items --
A Yes.
Q -- while you were at SUNY Stony Brook?
A Yes, I did.
Q With what frequency would you be handling Bunsen burner pads?

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A Regularly.
Q Any way to quantify what "regularly" would be?
MR. DARCHE: Don't guess.
A Daily, daily. The days I was at the laboratory obviously.
Q Where was the laboratory that you used these pads at SUNY Stony Brook?
A In the anatomy department.
Q Did you work out of one lab in the anatomy department?
A Yes.
Q Do you know if that lab had any other type of designation by room number or name or something like that?
A By room number, I don't recall the name.
Q Was it the first floor, second floor or something like that?
A First floor.
Q Describe for me what that lab looked like first in terms of its dimensions.
A Medium size, square feet I cannot estimate.
Q Did it have work stations or tables?
A About three large benches.

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Q And how many Bunsen burners were in there?
A I would estimate three.
Q One per bench, you think?
A Yes, pretty much.
Q How do you believe that you were exposed to asbestos from the Bunsen burner pads there?
A As the Bunsen burner experienced heat, the material degenerated, cracked and emitted dust.
Q Did these pads that we are talking about appear similar in their appearance to those that you had encountered previous to that?
A Yes, they did.
Q Was there anything different about their size, their shape, their consistency of the material or anything else from those that you had encountered previously?
A To my knowledge, no.
Q Did the circumference of the material inside the mesh look the same to you?
A Yes.
Q Did you have to at any time replace those pads that you encountered at the lab in the anatomy department at Stony Brook?
A Yes, I did.

A No.
Q Do you have any knowledge as to what portions of the mittens, what physical parts of the product contained asbestos?
A No.
Q Describe the mittens for me a little bit more if you could; what was the outside made of, the outside surface made of or what did it appear to be made of?
A Well, it was -- that's a difficult question. It was a somewhat coarse material, tanish, grayish. I don't have an obvious comparison. And certainly relatively sturdy, it wasn't like cloth.
Q Would you compare, would it be fair to compare it to some kind of coarse or rough fabric of some kind?
A Yes.
Q What was underneath that outer surface, if you know?
A I don't know.
Q Did you ever see what was underneath the outer surface?
A No.
Q Did you ever cut open a pair of gloves to

see?
A No.
Q Did you ever see a glove that was torn open so that you could see inside?
A No.
Q Do you know anything about what was the appearance or characteristics of the gloves other than what you could observe or feel on the outer surface?
A No. Other than their shape, that's part of the appearance.
Q Was the surface on the inside --
MR. ABERNETHY: Let me rephrase.
Q Was the surface that touched your hand as opposed to the surface facing away from your hand, was that the same material, those two sides?
MR. DARCHE: If you remember.
A I do not recall.
Q Were all the mittens that you used in the various labs in which you worked or did academic research the same color or approximately the same color?
A Yes.
Q You do not recall any that had any distinctive color that stood out like bright blue or

red or anything like that?
A No, I do not recall.
Q Was there anything about the design or construction of any particular pair of asbestos gloves or mittens that looked different than the others?
A No, not to my knowledge.
Q If I touched on this already, I apologize: Did you ever use any specific set of asbestos mittens that had something distinct or observable about it that enabled you to identify who made them or sold them?
MR. DARCHE: I am going to object to the form.
But you can answer.
A No.
Q How do you believe you were exposed to asbestos from mittens?
MR. DARCHE: I am going to object that this was gone over.
But you can answer again.
MR. ABERNETHY: I think he testified as to how he used mittens and what they were used for.
Q What I am trying to find out is how, if you know, did asbestos actually get from the mittens into

your body, if it did.
A Debris, micro debris, if you want, dust. The gloves, of course, were used to handle very hot materials and heat has deteriorating effects on any material. So, over longer periods of time there was disintegration, it's inevitable of any material that you use in this particular circumstance.
Q So, am I correct that you believe or observed that whatever was in that, on that surface of the glove would degrade over time and give off dust?
A The surface as well as perhaps the inside.
Q Did you ever see -- I thought you testified a few minutes ago you never saw the inside of any glove.
MR. DARCHE: I am just going to object to the argumentative nature of that question.
MR. ABERNETHY: I will rephrase it.
Q Do you recall testifying a few minutes ago that you did not see the inside of any asbestos mittens?
MR. DARCHE: I am going to object to the form, it mischaracterizes his testimony. That was not the question asked.
MR. ABERNETHY: Well, that is my question.

WITNESS CERTIFICATION

I have read the foregoing transcript of my testimony and find it to be true and accurate to the best of my knowledge and belief.

_____
CHRISTIAN HOLINKA

Subscribed and sworn to
before me on this _____ day
of _____, 2007.

_____
NOTARY PUBLIC

INDEX TO TESTIMONY

I, CHERYL F. BAREN, a Stenotype Shorthand Reporter and Notary Public within and for the State of New York, do hereby certify that the within Continued Examination Before Trial of CHRISTIAN HOLINKA was held before me and I faithfully and impartially recorded stenographically the questions, answers and colloquy.

I further certify that after said examination was recorded stenographically by me, it was reduced to typewriting under my supervision, and I hereby submit that the within contents of said examination are true and accurate to the best of my ability.

I further certify that I am not a relative of nor an attorney for any of the parties connected with the aforesaid examination, nor otherwise interested in the testimony of the witness.

_____
CHERYL F. BAREN

Exhibit F

ENVIRON

July 18, 2007

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RE: New York City Asbestos Litigation
Christian Holinka
Index No. 114128-06

Dear Sirs and Madams:

Thank you for the opportunity to review this matter and conduct an industrial hygiene assessment of the potential asbestos exposures in this case. It is my understanding that the Plaintiff in this matter, Dr. Christian Holinka, claims that his mesothelioma is the result of exposure to laboratory materials that he associates with having contained asbestos and which he handled over the course of his academic and professional career. I have been retained by Defendants ManorCare Health Services, Inc. (alleged to be a successor in interest to Central Scientific Company, a division of Cenco, Inc.) ("ManorCare"), Fisher Scientific International Inc. ("Fisher"), Baxter Healthcare Corporation (alleged to be a successor in interest to American Hospital Supply Corp. and American Scientific Products) ("Baxter"), VWR International, Inc. ("VWR") and Univar USA Inc. ("Univar") (collectively, the "Lab Supply Defendants") to render opinions related to potential asbestos exposures, if any, that might have arisen during the activities that Dr. Holinka undertook related to the use of certain

laboratory materials, specifically mittens and Bunsen burner pads, and to assess the possibility that there may have been alternative exposures that might explain the development of his mesotheliomas.

In the preparation of this report, I have reviewed the following documents supplied to me in this matter or in related matters that have relevance to this case:

Document Provided	Description	Date
Moline Report	Dr. Jacqueline Moline expert report	05/08/2007
Answers to Interrog	Letter of Application (complaint) and Plaintiff's Answers to Interrogatories	10/05/2006
Social Security Records	Social Security Records	Various
Holinka Depo I	Deposition under oral examination of Christian Holinka	02/12/2007
Holinka Depo II	Deposition under oral examination of Christian Holinka (Volume II)	02/22/2007
Holinka Depo III	Deposition under oral examination of Christian Holinka (Volume III)	03/01/2007
Plaintiff's Expert Report	Dr. James Stauchen, MD expert report Expert for the Plaintiff Pathologist	04/30/2007
Holinka CV	Curriculum Vitae of Christian Holinka	06/22/2006
Medical Records - Dr. Meyers	Medical Records from Dr. Robert Meyers	11/21/2006
Medical Records – NY Presbyterian Hospital	Medical Records from New York Presbyterian Hospital	
Medical Records – Dr. Taub	Medical Records from Dr. Robert Taub at the Herbert Irving Cancer Center	
Medical Records – Radiology	Medical Records from Columbia Presbyterian Eastside Radiology	02/01/2007
SSN Records	Social Security Records	
Workplace simulation report – Dr. Longo	The use of asbestos containing gloves: a work practice study (supplied in the matter of Thames v. Fisher Scientific)	08/2001

These documents provided information on the plaintiff's activities in academic, part-time employment, and full time employment settings. This report is intended to render an opinion on the sources of exposure to asbestos containing materials (ACM) and what contribution, if any, materials provided by the Lab Supply Defendants would have had on that exposure.

Qualifications

I am a nationally certified safety professional and certified industrial hygienist with more than 26 years experience as a safety and health professional. I have been involved in the assessment of asbestos exposures in numerous industries, including laboratories. I have had first hand experience with the laboratory products described in this case through my own academic training. During my time as the Director of Environmental Health and Safety for the New York City Department of Design and Construction, a public works agency

responsible for the construction and renovation of the majority of New York City's publicly owned buildings and infrastructure, I was involved in work in several city-owned laboratory facilities. I have conducted industrial hygiene studies of many different industrial workplaces, including laboratories and educational facilities. I have conducted a number of air sampling studies for the presence of asbestos in many different types of buildings. I carry United States Environmental Protection Agency (USEPA) and New York State Certificates as an Asbestos Building Inspector and Asbestos Project Designer and am intimately familiar with the uses of ACM in buildings, laboratory products and in other applications. I am a Fellow of the American Industrial Hygiene Association, a Professional Member of the American Society of Safety Engineers and a Diplomate of the American Academy of Industrial Hygiene. I am an adjunct professor at the Master's level teaching courses in industrial hygiene at St. Joseph's University in Philadelphia. My Curriculum Vitae is attached.

My opinions in this matter are stated within a reasonable degree of professional and scientific certainty.

Overview of Life and Work History

Dr. Holinka was born on July 7, 1937 in Germany and was a lifelong non-smoker. He immigrated to the United States in 1956 and worked briefly as an elevator operator before enlisting in the U.S. Army in that same year. After completing basic training, Dr. Holinka was stationed at Fort Sam where he was trained as a medical laboratory technician. From 1957 to 1959, Dr. Holinka worked in a medical laboratory while stationed at the 98 General Hospital. Dr. Holinka left military service in 1959 and worked for Booth Memorial Hospital for three to five months before enrolling as a student at the University of California at Berkeley. While an undergraduate, Dr. Holinka also worked part time in a research laboratory. Dr. Holinka then enrolled as a graduate student in biology at Hunter College, but transferred to medical school at McGill University after two semesters. In 1964, Dr. Holinka withdrew from medical school and started working full time for the same laboratory he had worked while an undergraduate. That same year, Dr. Holinka enrolled as a graduate student in physiology at UC Berkeley. After completing his Master of Science in physiology, Dr. Holinka enrolled as a graduate student in comparative literature and continued taking classes and working as a teaching assistant until 1971. In 1971, Dr. Holinka enrolled as a graduate student in biological sciences at the State University of New York at Stony Brook (SUNY Stony Brook). He was awarded his doctorate in 1974 and worked as a post-doctoral fellow from 1974 to 1977. Following his post-doctoral fellowship, Dr. Holinka worked as a research instructor and professor until 1989 at Mt. Sinai Hospital. From 1989 to 1996, Dr. Holinka was employed in the pharmaceutical industry with various companies. Since 1996, he has continued working with the pharmaceutical industry as an independent consultant.

In August of 2006, Dr. Holinka was diagnosed with malignant pleural mesothelioma.

Overview of industrial hygiene assessment of this case

In reviewing the information in this case, I have assessed the peer reviewed literature relative to the potential levels of exposure that would be associated with the use of the laboratory materials that Dr. Holinka alleges to have handled in the course of his academic studies, part time and full time employment, post graduate research, and faculty research. He claims that

his asbestos exposure occurred throughout his academic and occupational career. From his deposition testimony, I have assessed the exposure factors (time, frequency of use, duration of exposure and opportunities for exposure) that might have led to asbestos exposure. Based on this information, I calculated a reasonable maximum estimate of his potential average daily and lifetime cumulative exposures from the use of certain products that Dr. Holinka allegedly handled, including mittens and Bunsen burner pads, and that he alleges contained asbestos. I compared the reasonable maximum estimates to available data on cumulative exposure studies associated with the development of mesothelioma. I also compared this to cumulative levels that are associated with lifetime exposures to asbestos in the ambient environment as well as the level that a worker exposed at the current Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit (PEL) would have over a working lifetime.

The industrial hygiene approach

As defined by the American Industrial Hygiene Association (AIHA), industrial hygiene (IH) is "the science and art devoted to the anticipation, recognition, evaluation, and control of those environmental factors or stresses arising in or from the workplace which may cause sickness, impaired health and well being, or significant discomfort among workers or among citizens of the community" (http://www.aiha.org/Content/AboutAIHA/whatisIH.htm). The anticipation and recognition functions of industrial hygienists are supported by reviews of the relevant scientific literature and by familiarity with various workplaces and work practices. The evaluation function is supported by visual inspections of work places and practices, knowledge of the processes, the sources of emission, and by objective measurements of the agent of concern. Such objective measurements can be obtained from peer-reviewed studies of the specific tasks or studies of analogous tasks that have similar exposure conditions or through contemporary field measurements or workplace simulations. A critical aspect of the industrial hygiene approach is identifying and implementing measurement techniques and analysis methods appropriate to the type of compound of interest and considering the potential interferences that can arise from the work environment.

When properly performed, the results of the workplace measurements can be compared to regulatory standards, such as the OSHA PEL, or consensus non-regulatory guidelines, such as the American Conference of Governmental Industrial Hygienists Threshold Limit Values. However, the assessment process is not limited to the comparison of results to standards or guidelines. The appropriate interpretation of exposure measurements includes an assessment of the magnitude of human health risks experienced by individuals with exposures at various levels and for different amounts of time. This assessment includes calculating a likely range of exposures experienced by individuals under different circumstances, and comparing those exposure estimates to exposure levels that have been associated with health risks as described in the literature.

If the potential for an unacceptable level of exposure is identified in the course of an evaluation, IH practitioners also posses the training and expertise to recommend appropriate and practical methods to reduce or eliminate exposure through engineering, environmental, or administrative controls, or the use of personal protective equipment.

Exposure estimation using IH data

From the IH perspective, the assessment of an individual's asbestos exposure is evaluated based on the following factors:

- exposure magnitude (concentration in the air);
- exposure intensity (hours of exposure each day or week); and
- exposure duration (number of years of exposure).

With respect to asbestos-related diseases, it is also essential to account for fiber type and fiber size in order to characterize health risks appropriately.

Exposure magnitude, intensity and duration

Industrial hygienists typically summarize exposure with measures that integrate magnitude, intensity and duration of exposure. The magnitude of exposure to asbestos is generally measured in units of fibers per cubic centimeter of air (f/cc). When multiplied by the intensity of exposure, the result is the daily average or time-weighted average (TWA). For the assessment of occupational exposures, an 8-hour workday is assumed. Cumulative exposure metrics additionally account for the exposure duration, in years, and are typically expressed as fiber-years/cc or sometimes simply fiber-years. For example, a daily TWA exposure of 0.1 f/cc for 1 year would result in a cumulative exposure of 0.1 fiber-years/cc.

Lifetime cumulative exposure associated with employment is considered to occur over 40 to 45 years (i.e., the expected duration of a person's working life, if employment begins at age 20 and ends at age 60 or 65). The lifetime cumulative asbestos exposure of a worker employed for 40 years at the current OSHA PEL of 0.1 f/cc (OSHA 1994) will be 4 fiber-years/cc. Asbestos-related lung diseases (malignant and nonmalignant) or signs of these diseases have been reported in groups of occupationally exposed humans with cumulative exposures ranging from about 5 to 1,200 fiber-years/cc. Such cumulative exposures would result from 40 years of occupational exposure to concentrations ranging from 0.125 to 30 f/cc. (ATSDR 2001).

Small quantities of asbestos fibers are ubiquitous in air, arising from natural sources, windblown soil from hazardous waste sites, deterioration of automobile clutches and brakes, or breakdown of asbestos-containing materials such as insulation (ATSDR 2001). In some urban environments, the ambient concentration of asbestos has been reported to be as high as 0.001 f/cc (IPCS 1986). For a 70-year lifetime, this would result in a total cumulative exposure of 0.07 fiber-years/cc. Such a cumulative level of exposure is not known to be associated with any increased risk of asbestos related disease.

Fiber type

Chrysotile asbestos is unique in that it has a serpentine fiber-formation (curled fibers) compared to the amphibole fibers, including amosite and crocidolite, which are straight and needle-like. Chrysotile asbestos is less likely to be retained in the lung if inhaled with a short half-life on the order of weeks or months. In contrast, amphibole fibers have a half-life in the lung of 20 to 40 years. Amphiboles are thus considered to be more biologically active than chrysotile (Rasmuson 2004) and have been found to be more strongly and consistently

associated with risk of mesothelioma, compared with chrysotile, in persons occupationally exposed to asbestos (Hodgson, 2005).

According to a 1988 review by Churg, although chrysotile asbestos may produce mesothelioma in man, the total number of such cases is small and the required doses are extremely high. Some studies suggest that the cumulative lifetime exposure to chrysotile would need to be in the range of 25 fiber-years/cc to 100 fiber-years/cc (Rasmuson 2004). In the absence of any amphibole exposure, the risk of mesothelioma from exposure to chrysotile fibers alone, especially in low concentrations, is considered insignificant.

Chrysotile is the most common form of asbestos used in the United States, making up nearly 99% of all asbestos products that were produced (NIOSH/OSHA 1980; ATSDR 2001). Virta (2005) reported that chrysotile accounted for 96% of the world production and consumption of asbestos products from 1900 to 2003. Laboratory products that have been studied, such as asbestos gloves, have been found to contain only chrysotile. It is likely that products like Bunsen burner pads would also be chrysotile containing since the amphiboles tend to be more inflexible and thus are more limited in being fabricated into products (ATSDR 2001). The white color of the center is also a indication that the product is chrysotile containing; chrysotile fibers are white, amosite is yellowish-brown, and crocidolite is a lavender or blue color (Virta 2005). The amphibole forms, based on information in the literature and my personal experience in the inspection and sampling of buildings for the presence of ACM, are more commonly associated with friable insulation materials, especially steam pipes and boilers. Amosite was commonly used in marine vessels (Harries 1971) and industries with hot processes such as steel mills. Crocidolite was also used in some marine vessels (Harries 1971) and was used in gaskets associated with acid piping in pulp and paper mills (Mangold 2006).

Fiber size

The final determinant of risk for the development of asbestos related diseases is fiber size. Studies have consistently shown that long thin fibers greater than 5 microns in length with an aspect ratio (length to width ratio) equal to or greater than 3:1 present the greatest risk of mesothelioma development (ERG 2003). Particles that do not meet these size parameters are not known to be associated with an increased risk for the development of asbestos related diseases.

Exposure estimation

The first step in the estimation of the exposure that an individual may have received is a careful review of the scientific literature for information on historic exposures associated with the job or task that the person performed. A tool that is used for this purpose is PubMed, provided by the US National Library of Medicine. PubMed is a powerful standard research tool available free over the internet, which can search the scientific literature published since about 1966. Publications available via the NIOSH, OSHA and USEPA websites can also provide valuable historic exposure information. Where there is no specific data available for a particular work task, the industrial hygienist will use estimates from jobs with similar exposure conditions or work practices. In addition, there are also general groupings of exposure values associated with the use and handling of certain types of materials. For example, work involving non-friable asbestos materials have had historic airborne concentrations that range from 0.01 to 0.1 f/cc, with many data in the ambient

background range (Rasmuson 2004). If an individual is working with a non-friable material, then the industrial hygienist will assign a value based on the nature of the work that is being performed, selecting the lower end of the range for work that involves limited opportunities for disturbance and selecting the higher end of the range if the work involves tasks with more potential for disturbance. From this information, an exposure value (or range of values) is assigned to each job or task and, with the exposure time factors, is used to provide a reasonable maximum estimate of the daily 8-hour TWA. When multiplied by the duration of exposure, the individual contribution to the cumulative lifetime exposure can be determined for each task or job. The sum of the individual contributions is the total cumulative lifetime exposure for the individual, which can then be compared to information related to the lifetime risk for the development of disease.

Opportunities for Exposure

U.S. Army

Dr. Holinka trained and worked as a laboratory technician in the U.S. Army from 1956 to 1959. During the four and a half to five months of training, Dr. Holinka reportedly spent 5 to 6 hours per day working in a laboratory. The alleged asbestos exposures occurring during training included asbestos Bunsen burner pads and components from incubators; however, no exposures were alleged to have occurred during the first two months (basic training) and during the last two months of his training. Bunsen-burners were used approximately 2-hours per week and the pads were replaced "once they became brittle or somewhat dusty". Dr. Holinka alleges that he used an incubator for bacterial cultures and that the incubator may have contained components manufactured from asbestos. After completing training, Dr. Holinka worked as a laboratory technician in biochemistry, hematology, and pathology at the 98 General Hospital in Germany. While stationed in Germany, Dr. Holinka alleged exposure from asbestos mittens and Bunsen burner pads. The pads were used on a daily basis and changed once per week due to observed wearing of the asbestos pad. Asbestos mittens were also used on a daily basis for short periods, only minutes in many cases. With the exception of wearing a mask while working with bacterial cultures, no respiratory protection was worn while training or working in the laboratory for the U.S. Army.

Academic Coursework and Research

As an undergraduate, Dr. Holinka majored in French literature and had a minor in physiology. He completed his degree requirements and graduated in two and a half years. During the course of his undergraduate education, Dr. Holinka alleges that he used asbestos mittens and Bunsen burner pads in approximately six laboratory courses in chemistry and physiology. The mittens were reportedly used several times a session; a session defined as meeting twice a week for 3 hours over twelve weeks.

From the fall of 1962 to late spring of 1963, Dr. Holinka attended Hunter College in New York. He reported using asbestos burner pads in one course that met for three hours once a week for four months. Dr. Holinka left after two semesters to attend medical school at McGill University in Montreal. He alleged no use of asbestos products while at McGill, which lasted only two semesters.

From August of 1964 to August of 1968, Dr. Holinka was enrolled as a graduate student in physiology at UC Berkeley. He alleges exposure to asbestos mittens and burner pads while

performing research for his dissertation but the frequency and duration were not provided. His research was focused on rat brain endocrinology. After completing this degree, Dr. Holinka continued further studies in comparative literature, a program where he had no opportunities for exposure to laboratory equipment.

From 1971 to 1974, Dr. Holinka was enrolled as a graduate student in biological sciences at SUNY Stony Brook. He reported using asbestos mittens and Bunsen burner pads while performing research in the anatomy department for his degree. His research focused on hormonal control of the maternal paramount in rats. Most of the experiments conducted for his research were behavioral experiments. Dr. Holinka alleges that burner pads were used on a daily basis and were replaced no more than once per month. The mittens were reportedly used once every few days and were replaced approximately every four months.

Part Time and Temporary Laboratory Employment

After leaving military service, Dr. Holinka worked for 3-months (40hrs/week) as a laboratory technician at Booth Memorial Hospital. His work included clinical chemistry and analysis of human material serum and urine. Alleged asbestos exposure occurred as a result of his handling of asbestos mittens and Bunsen burner pads. Burner pads were used on a daily basis and were reportedly replaced every few days due to wearing of the pad. Mittens were used on a daily basis to handle hot glassware

While attending UC Berkeley as an undergraduate, Dr. Holinka worked part-time (12-20 hrs/week) in a research laboratory from the spring of 1960 to summer of 1962. His responsibilities were generally limited to analysis of California soils. He alleges use of asbestos burner pads and mittens. The burner pads were changed once ever two to three weeks. The mittens were reportedly used several times a week to handle hot glassware. Dr. Holinka described using mittens to swirl a flask while heating solutions and to remove glassware from a hot drying oven.

In the winter of 1964, Dr. Holinka left medical school and started working full time (40 hrs/week) in the same laboratory he had worked in as an undergraduate. He remained a full time employee of the laboratory until August of 1964. This time period of employment is not reflected in the social security records that were provided. During this period of time, Dr. Holinka allegedly used asbestos mittens and burner pads. From the end of 1961 until the beginning of 1971, Dr. Holinka did not work for a private employer as evidenced by his social security records.

Dr. Holinka was employed part-time (18 hrs/week) at the Columbia University Presbyterian Medical Center from 1971 to 1974 while pursuing his doctorate in biological sciences at SUNY Stony Brook. While working in this laboratory, Dr. Holinka's primary responsibility was the analysis of human serum plasma. Dr. Holinka alleges that he used asbestos mittens once every two weeks and burner pads on a daily basis.

Post-Doctoral and Faculty Research

From 1974 to 1977, Dr. Holinka worked as a post-doctoral fellow at the University of Southern California. This was primarily a research position; however, five to ten percent of his time was devoted to teaching. His research included animal work and biochemical

analysis and he would wear a surgical mask while performing experiments. Dr. Holinka reported using asbestos burner pads and mittens during this period of time.

After completing his post-doctoral fellowship, Dr. Holinka worked as a research instructor and later as a research professor at Mount Sinai from August 1977 to July 1989. He was involved in animal research and biochemical research in women's health care. Asbestos burner pads and mittens were used on a daily basis. Burner pads were replaced once every two months.

After 1989, Dr. Holinka began employment in the pharmaceutical industry with a number of firms and then became an independent consultant to the industry. He did not have any known asbestos exposures during this period of his career.

Summary of Opportunities for Exposure

Dr. Holinka provided limited information on the exact amount of time that he handled the Bunsen burner pads and the mittens that he claimed to use routinely. From his depositions, Dr. Holinka's first alleged asbestos exposure occurred while training and working as a laboratory technician in the U.S. Army from 1956 to 1959. From 1959 to 1963, Dr. Holinka had limited intermittent asbestos exposure while working with asbestos mittens and burner pads in academic and part-time employment laboratories. No alleged asbestos exposure occurred during the two semesters that Dr. Holinka was enrolled in medical school. From 1964 to 1966, Dr. Holinka again had limited intermittent exposure to asbestos mittens and burner pads. No alleged asbestos exposures occurred while he was pursuing a degree in comparative literature from 1966 to 1968 or while taking literature courses from 1968 to 1971. From 1971 to 1989, Dr. Holinka had limited exposure to burner pads and asbestos mittens. No alleged asbestos exposures have occurred since 1989.

In all, based on the very limited information that Dr. Holinka provided, I have estimated that his daily handling of the Bunsen burner pads would have been only about 60 minutes per day, three days per week for 20 years (taking into consideration the fact that he had several years where he did not have any potential exposure, did not work in the laboratory full time for much of this time, and had periods of time where he did not handle the pads on a daily basis). Likewise, his use of mittens for handling hot glassware would also be no more than 60 minutes per day, but the usage was likely only two days per week for 20 years (again considering that he did not use the mittens on a daily basis, did not work full time in the laboratory, and had time periods where he did not perform any lab work).

From his depositions, it was not possible to identify any other sources of asbestos exposure from his academic or professional careers.

Exposure Assessment

Asbestos Mittens

There have been studies of the use of asbestos containing gloves and mittens similar to the products used by Dr. Holinka. One study that has been frequently cited is the 1981 study by Samimi on asbestos exposure from wearing asbestos gloves. As part of the study, Samimi reported concentrations of airborne fibers emitted in five actual workplace laboratories that would have been similar to the laboratory environment in which Dr. Holinka worked. The

results ranged from 0.07 f/cc to 2.93 f/cc (mean = 0.83 f/cc; 7 samples). Samimi noted that the gradual soiling of gloves reduces the extent of fiber emissions although prolonged use could result in damage or deterioration. In discussing the range of measurements obtained from the five workplace laboratories, the study authors assert that differences in room size and arrangements, room ventilation system, and amount of moisture on the gloves are factors that influence exposure of workers. Gloves were composed of asbestos cloth containing 80-85% asbestos and 15-20% rayon and were treated with an acrylate-base compound to make them "lint-free." The fiber type was not specified in the study.

One of the major limitations of the study by Samimi is the use of the Phase Contrast Microscopy (PCM) analytical methodology. The PCM method is the most common method for the measurement of asbestos fibers in air and continues to be used extensively today. However, a significant limitation is that it does not distinguish asbestos fibers from other fibers. Although optical counting methods using membrane filters had been employed previously, the standard PCM methodology was not established by the National Institute for Occupational Safety and Health (NIOSH) until 1977. It was superseded by NIOSH Method 7400 around 1984. The approach to determining the level of fibers is defined by fiber counting rules. The fiber counting criteria include the counting of only fibers equal to or longer than 5 microns and the counting of all particles *as asbestos* (emphasis added) that have a length-to-width ratio (aspect ratio) of 3:1 or greater (NIOSH 1994). As stated in the documentation of the method, other airborne fibers (that is, non-asbestos fibers) may interfere, since all particles meeting the counting criteria are counted (NIOSH 1994). Thus the presence of gypsum, cement, silica, mineral wool, fiberglass, cellulose and other natural and man-made particles can, and often are, counted and treated as if they were asbestos. Consequently, an analysis by PCM indicating elevated fiber counts does not necessarily indicate the presence of asbestos nor the true magnitude of the exposure. At best, PCM merely provides an index of exposure to particles present in a given size range and shape, not necessarily that those fibers are asbestos (Baron 2001).

Another major limitation is that no background samples were reported to have been collected in the laboratories where Samimi conducted his measurements prior to the sampling to assess ambient fiber levels. Without controlling for ambient fibers, such as clothing, human hair, fibrous glass, or other fibrous matter, the asbestos exposure levels obtained in the Samimi study most likely overstate the true concentration.

Samimi also conducted testing in isolation chambers, which resulted in concentrations ranging from 0.95 to 11.74 f/cc. The range of results from the isolation chambers, which are substantially greater than the modern OSHA PEL, were most likely due to poor quality assurance methods that were in place at the time of the study and potentially poor housekeeping practices between simulations (Cherrie 2005). I am aware of some modern simulations that were carried out in isolation chambers that had high ambient fiber backgrounds, specifically a study by Dr. William Longo, of gaskets in which the background concentration in one of the simulations exceeded the OSHA PEL (Longo 2002). This type of poor quality control could explain the elevated results that were found during the sampling in the isolation chambers.

In a 2005 study on asbestos exposure from wearing asbestos mittens, Cherrie collected measurements during three separate glass manufacturing tasks. Chrysotile asbestos mittens

made in the 1970s were used. This study simulated three test conditions that would involve aggressive handling of materials while wearing mittens, methods that would be more aggressive than would be typical of use in a laboratory. In this study, the authors provided detailed information as to how they controlled for non-asbestos fibers through a process of cleaning and vacuuming the chambers after each simulation.

The tasks were performed both with no ventilation and with high ventilation within a 45 cubic meter enclosure. Laboratories typically have high ventilation rates due to the presence of fume hoods and the handling of chemical and biological agents. Ventilation requirements in the current American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE 2004) for laboratories require 1.0 cubic foot of air volume for every square foot of laboratory space. This requirement is greater than for nearly all other occupancies, except of automobile garages. The presence of fume hoods places additional demand for replacement air that can result in up to 10 air changes per hour in laboratory spaces (DiBerardinis 1993), again a level that is higher than most other occupancies.

The reported mean personal airborne fiber concentration from 33 samples ranged from 0.03 f/cc to 0.48 f/cc. The lowest mean fiber concentrations were obtained when high localized ventilation was used, and the highest mean concentrations were obtained when no ventilation was used. Both new and aged mittens were utilized, and the differences between mean airborne fiber concentrations for aged gloves and new mittens were not statistically significant. Based on observations made during the tests, obvious releases of airborne dust occurred when the mittens were abraded on sharp metal edges. Each simulation was carried out over a 30-minute period, and each task investigated was continuously repeated during that period. Cherrie found levels of fiber release from gloves, but ultimately concluded that the levels are not indicative of increased risk. As with the Sanimi study, the authors used the PCM method for analysis, which could overstate the levels of fiber in the air. In addition, these results were not weighted for an 8-hour work day.

I have been provided with a workplace simulation conducted by Dr. Longo, provided to me in another matter. While Dr. Longo has used methods that are not consistent with accepted IH practice in other workplace simulations that he has undertaken, such as using Tyndall lighting and indirect preparation of samples for transmission electron microscopy analysis, my review of this simulation found that his methods and interpretation were in general conformance with good IH practice. In this simulation, gloves composed of 75% chrysotile asbestos were used. This simulation involved the repeated handling of bricks, which would result in aggressive and abrasive methods that would not be typical for laboratory use. In the simulation, 12 bricks were moved while wearing the gloves and the activity was repeated once each hour for four hours. The task based concentration results from this simulation were reported to be 0.02 f/cc.

It is my opinion that the data from the Cherrie and Longo studies are the best representation of Dr. Holinka's likely exposure from the use of the mittens. Based on the Cherrie study and the Longo simulation, it is my opinion that a reasonable maximum task based exposure would be 0.02 f/cc and a reasonable maximum estimate of the TWA exposure for Dr. Holinka, based on the frequency of glove use (which was infrequent, intermittent and irregular), would be 0.001 f/cc. With a daily average in this range for fifteen years, the reasonable maximum contribution to Dr. Holinka's lifetime cumulative exposure from his

use of asbestos mittens would be no more than 0.02 fiber-years/cc. The fiber type would have been chrysotile asbestos.

Bunsen Burner Pad

There have been no studies of the potential for the release of asbestos from the use of Bunsen burner pads in the peer-reviewed scientific literature. Bunsen burner pads were composed of iron wire mesh gauze, which came in various sizes and had a thin, small diameter, white circular center that contained asbestos. The white coloration of the center material is an indication that it is chrysotile containing as discussed previously. This thin layer of asbestos was designed to protect the bottom of the glassware from the high heat of a Bunsen burner flame.

While the fiber type and percentage of asbestos content in the pad is not known, it was most likely chrysotile due to the preponderance of chrysotile use in the United States. In addition, the center of the pad would not be friable, that is, not easily crushed or pulverized to powder by hand pressure, and would not release fibers under normal handling due to the binding of the asbestos fibers within a solid matrix. Using the pads as intended would not release fibers readily when used in normal laboratory heating procedures. It would require aggressive actions like sanding, grinding or abrading the center to release fibers, an activity that was not done by Dr. Holinka.

I have had personal first hand experience in the use of these Bunsen burner pads both in my academic experience and as a result of laboratory health and safety audits that I have conducted throughout my career. From my personal experience in a laboratory, the actual time spent handling the pads is minimal, only minutes per day. The pad is placed on a ring stand upon which a flask, beaker, or other type of glassware would be placed. The Bunsen burner would be placed underneath. During the heating of the glassware, there is no opportunity to come into contact with the pad. If running multiple tests, the pad would be left on the ring stand. Once the tests were completed, the pad would typically be stored once it had cooled and could be safely handled.

Dr. Holinka repeatedly stated that he believed that ambient asbestos fibers were likely generated as the heat from the Bunsen burners caused the fibers in the burner pads to become brittle. He could not recall the temperature of the Bunsen burner, nor could he recall the fuel source for the burners. Based on his descriptions, it is my opinion that the flaking and damage of the pads was due to thermal degradation of the asbestos due to the application of high heat.

A Bunsen burner is a gas burner commonly used in laboratories, most typically using natural gas as a fuel source, which can produce a flame capable of reaching temperatures of 1,500° Celsius (°C) or 2,732° Fahrenheit (°F) or higher (Bunsen burner 1998; Flinn 2007). All forms of asbestos are subject to melting and thermal degradation at temperatures beginning at 600 °C. Chrysotile will decompose to forsterite, a member of the olivine mineral family and a material that is not asbestos, starting around 500 °C with conversion to well-crystallized forsterite at temperatures from 800 °C (Jeyaratnam 1994) to 850 °C (ATSDR 2001; Virta 2002). The amphibole forms also degrade with exposure to high temperatures. Amosite will degrade in to spinel, hematite and cristobalite starting at 600 °C. Crocidolite

will degrade into acmite, hematite and cristobalite starting at 800 °C. Heating for as little as 30 minutes at temperatures of 900 °C will result in the breakdown of all asbestos (Jeyaratnam 1994). These degradation reactions are not reversible.

As described by Dr. Holinka, the pads would wear out and he would replace them, sometimes as often as once every few days. Being subjected to frequent high heating with the Bunsen burner, at temperatures that were at or above 900 °C, the degradation reported by Dr. Holinka was reasonably the result of the breakdown of the asbestos fibers in the pad to non-fibrous, non-asbestos forms that are not linked to the development of mesothelioma.

Dr. Holinka's opportunity for exposure to asbestos from the use of the burner pads was irregular, intermittent and very limited. On average, he would have used these pads no more than a few hours per week, in many cases reasonably only minutes per day, with many periods of non-use. While the pads may have worn out frequently and needed to be replaced, this does not mean that he was exposed to asbestos fibers. He did not grind or pulverize the pads and did not take actions that would have readily released the asbestos fibers from the binder material.

The burner pads were not subject to aggressive handling other than the heating. If the use of woven gloves, picking up bricks, as simulated by Dr. Longo, could not create levels of asbestos greater than 0.02 f/cc, there is no possibility that the brief handling of intact burner pads could create levels higher than 0.02 f/cc. Any particulate that would be released from used pads that had been heated repeatedly would not be asbestos, having been degraded by the heat to non-asbestos forms. It is my opinion that, with a task based exposure that would be no greater than 0.02 f/cc for no more than 60 minutes per day for about three days a week, a reasonable maximum estimate of the TWA exposure for Dr. Holinka, based on the frequency of pad use (which was infrequent, intermittent and irregular), would be 0.0015 f/cc as a daily average. The reasonable maximum contribution to Dr. Holinka's lifetime cumulative exposure as a result of his use of the Bunsen burner pads would be no more than 0.03 fiber-years/cc.

Exposure Summary

The total cumulative exposure that Dr. Holinka would have had from the use and handling of the two primary laboratory products identified in his depositions has been reasonably estimated to be no more than 0.05 fiber-years/cc and with a high degree of certainty that the true exposure was in fact lower than this estimate. This level is still less than the cumulative exposure that a person living 70 years in an urban environment would receive from the presence of asbestos that is naturally present in the air. This level is also nearly two orders of magnitude less than the lifetime occupational exposure that a person working in an environment with TWA concentrations at the current OSHA PEL would receive.

Opinion

It is my overall opinion, within a reasonable degree of professional and scientific certainty, that Dr. Holinka's pleural mesothelioma was not the direct result of exposure to any asbestos containing products identified by Dr. Holinka. It is reasonable that the products allegedly used by Dr. Holinka were only chrysotile containing, a material that is not known

to have the potency for inducing mesothelioma, particularly at the exposure levels that would have been present in the laboratory environments in which he worked. Even at higher levels, the association of chrysotile to mesothelioma is weak. The 8-hour TWA concentrations and the lifetime cumulative exposures he had would be insignificant and irrelevant to the development of mesothelioma.

Further, it is my opinion that he had little or no exposure to asbestos from the brittle Bunsen burner pads due the asbestos undergoing thermal degradation because of the routine heating to elevated temperatures of greater than 900 °C. Asbestos present in the pad would be converted to other non-asbestos mineral forms, such as forsterite, that are not associated with a risk of mesothelioma development.

It is my opinion that there was no substantial asbestos exposure in Dr. Holinka's academic and professional career to explain the development of his pleural mesothelioma.

If you have any questions please do not hesitate to call me at (609) 243-9848.

Respectfully yours;

Robert C. Adams, MS, CIH, CSP
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